

ST series servo motor Information

(including amplifier)

CNCmakers Limited

2008.07

TEL:0086-13824444158 FAX: 0086-20-84185336

catalog

main parameters of ST series servo motor

parameters of ST80 series servo motor

parameters of ST110 series servo motor

parameters of ST130 series servo motor

parameters of ST150 series servo motor

mounting sizes of ST series servo motor

introduction of incremental encoder(F)

introduction of wireless incremental encoder(F1)

Introduction of serial encoder (TS5667N120 , 17/33bi ,Tamagawa)

Introduction of serial encoder (TS5669N120 , 17/33bi ,Tamagawa)

Introduction of serial encoder (TS5668N21 , Tamagawa)

parameter of resolver

AC motor

● AC motor



ST series motor	Main parameter		
model	Nominal torque	Nominal speed	Nominal power
80ST-M01330	1.3Nm	3000rpm	0.4Kw
80ST-M02430	2.4Nm	3000rpm	0.75Kw
80ST-M03330	3.3Nm	3000rpm	1.0Kw
110ST-M02030	2 Nm	3000 rpm	0.6 Kw
110ST-M04030	4 Nm	3000 rpm	1.2 Kw
110ST-M05030	5 Nm	3000 rpm	1.5 Kw
110ST-M06020	6 Nm	2000 rpm	1.2 Kw
110ST-M06030	6 Nm	3000 rpm	1.6 Kw
130ST-M04025	4 Nm	2500 rpm	1.0 Kw
130ST-M05020	5 Nm	2000 rpm	1.0 Kw
130ST-M05025	5 Nm	2500 rpm	1.3 Kw
130ST-M06025	6 Nm	2500 rpm	1.5 Kw
130ST-M07720	7.7 Nm	2000 rpm	1.6 Kw
130ST-M07725	7.7 Nm	2500 rpm	2.0 Kw
130ST-M07730	7.7 Nm	3000 rpm	2.4 Kw
130ST-M10015	10 Nm	1500 rpm	1.5 Kw
130ST-M10025	10 Nm	2500 rpm	2.6 Kw
130ST-M15015	15 Nm	1500 rpm	2.3 Kw
130ST-M15025	15 Nm	2500 rpm	3.8 Kw
150ST-M15025	15 Nm	2500 rpm	3.8 Kw
150ST-M18020	18 Nm	2000 rpm	3.6 Kw
150ST-M23020	23 Nm	2000 rpm	4.7 Kw
150ST-M27020	27 Nm	2000 rpm	5.5 Kw

ST series servo motor model explain

<u>110</u>	<u>ST</u>	<u>—M</u>	<u>050</u>	<u>30</u>	<u>L</u>	<u>F</u>	<u>B</u>	<u>Z</u>
1	2	3	4	5	6	7	8	9

1: express motor external diameter, unit: mm。

2: express PWM(sine wave) control PMSM AC servo motor。

3: express sensor, M—optical encoder, X—resolver。

4: express nominal torque(0 speed),the value is number×0.1, unit: Nm。

5: express nominal speed, the value is number×100, unit: rpm。

6: express amplifier nominal voltage, L—AC220V, H—AC380V。

7: express detail of the sensor, F—2500 C/T incremental encoder; F1—2500 C/T wireless incremental encoder; R—resolver with 1 bi-pole; E—17bit single-turn serial encoder; M—17/33bit multi-turn serial encoder。

8: express motor type, B—basis。

9: express mechanical brake is installed。

AC motor

●parameter chart of 80 series motors

Motor model	80ST-M01330				80ST-M02430				80ST-M03330			
Power(Kw)	0.4				0.75				1			
Nominal torque(Nm)	1.3				2.4				3.3			
Nominal speed(Rpm)	3000				3000				3000			
Nominal current(A)	2.6				4.2				4.2			
Rotor inertia(Kgm ²)	0.74×10 ⁻⁴				1.2×10 ⁻⁴				1.58×10 ⁻⁴			
MTC (Ms)	1.65				0.993				0.83			
ETC (Ms)	6.435				7.272				7.668			
Torque constant(Nm/Arms)	0.5				0.571				0.786			
EMF (V/Krpm)	21.05				22.77				29.27			
★ Resistance per phase(Ω)	1.858				0.901				1.081			
★ Inductance per phase(mH)	11.956				6.552				8.29			
Max current(A)	7.8				12.6				12.6			
Max torque(Nm)	3.9				7.2				9.9			
Number of pole-pairs	4											
Connector of motor winding	terminals	U			V			W			⊕	
	number	2			3			4			1	
Connector of encoder（F1）	Signal	5V	0V	A+	A-	B+	B-	Z+	Z-	⊕		
	number	2	3	4	7	5	8	6	9	1		
Resolution(C/T)	2500C/T											
Connector of encoder（E）	signal	5V	0V	NC		NC		SD+	SD-	⊕		
	number	2	3	4		5		6	7	1		
Resolution（E）(C/T)	Single-turn 17bit（131072 C/T）											
Insulation brake	B											
Operating condition	temperature: 0～55℃ humidity: <90%（no dew condensation）											
Protection	IP65											
Weight（suttle）(Kg)	2.2				2.8				3.3			

note:

MTC: Mechanical time constant

ETC: Electric time constant

EMF: Back electromotive force coefficient

U、V、W are motor windings

A+, B+, Z+, A-, B-, Z- signals (compound signal) are encoder outputs

E+, E- are down-lead of battery SD+, SD- are date outputs

★The value of resistance will change with temperature , if resistance is R_{25} at a temperature of 25℃ , when the temperature change to T , the value of the resistance will change to R_t , R_t is :

$$R_t = \frac{1 + 0.0043T}{1.1075} R_{25}$$

★The inductance test frequency is 1000Hz

AC motor

parameter chart of 110 series motors

★	Motor model	110ST-M02030				110ST-M04030				110ST-M05030				110ST-M06020				110ST-M06030			
	Power(Kw)	0.6				1.2				1.5				1.2				1.6			
	Nominal torque(Nm)	2				4				5				6				6			
	Nominal speed(Rpm)	3000				3000				3000				2000				3000			
	Nominal current(A)	4				5				6				6				8			
	Rotor inertia(Kgm ²)	0.425×10 ⁻³				0.828×10 ⁻³				0.915×10 ⁻³				1.111×10 ⁻³				1.111×10 ⁻³			
	MTC (Ms)	4.995				3.023				2.24				2.205				2.003			
	ETC (Ms)	2.972				3.884				4.085				4.178				4.482			
	Torque constant(Nm/Arms)	0.5				0.8				0.833				1				0.75			
	EMF (V/Krpm)	23.59				33.74				33.84				41.390				30.51			
★	Resistance per phase(Ω)	0.979				0.779				0.567				0.662				0.338			
★	Inductance per phase(mH)	2.908				3.026				2.316				2.764				1.515			
	Max current(A)	12				15				18				18				24			
	Max torque(Nm)	6				12				15				18				18			
	Number of pole-pairs	4																			
	Connector of motor winding	terminals	U				V				W				⊕						
		number	2				3				4				1						
	Connector of encoder (F)	signal	5V	0V	A+	A-	B+	B-	Z+	Z-	U+	U-	V+	V-	W+	W-	⊕				
		number	2	3	4	7	5	8	6	9	10	13	11	14	12	15	1				
	Resolution (F) (C/T)	2500C/T																			
	Connector of encoder (F1)	signal	5V		0V		A+		A-		B+		B-		Z+		Z-		⊕		
		number	2		3		4		7		5		8		6		9		1		
	Resolution (F1) (C/T)	2500C/T																			
	Connector of encoder (M)	signal	5V		0V		E+		E-		SD+		SD-		⊕						
		number	2		3		4		5		6		7		1						
	Resolution (M) (C/T)	Single-turn 17bit (131072 C/T) multi-turn 16bit (65536 C/T)																			
	Connector of encoder (E)	signal	5V		0V		NC		NC		SD+		SD-		⊕						
		number	2		3		4		5		6		7		1						
	Resolution (E) (C/T)	Single-turn 17bit (131072 C/T)																			
	Resolver (R)	signal	R1		R2		S1		S3		S2		S4		⊕						
		number	2		3		4		5		6		7		1						
	Mechanical brake	Number	1				2				3										
		Power	24VDC (-15%~+10%)										⊕								
		parameter	current: ≤0.6A brake torque: ≥8Nm inertia: 0.64×10 ⁻⁴ Kgm ²																		
	Insulation brake	B																			
	Operating condition	temperature: 0~55℃ humidity: < 90% (no dew condensation)																			
	Protection	IP65																			
	Weight (suttle) (Kg)	4.2				6.0				6.8				7.8				7.8			

Note :

MTC: Mechanical time constant

ETC: Electric time constant

EMF: Back electromotive force coefficient

U、V、W are motor windings

A+、B+、Z+、A-、B-、Z-、U+、U-、V+、V-、W+、W- signals are incremental encoder outputs

A+、B+、Z+、A-、B-、Z- signals (compound signal) are wireless encoder signal

E+、E- are down-lead of battery SD+、SD- are date outputs

R1—R2 are primary signals S1—S3, S2—S4 are secondary signals

★The value of resistance will change with temperature, if resistance is R₂₅ at a temperature of 25℃, when the temperature change to T, the value of the resistance will change to R_t, R_t is :

$$R_t = \frac{1 + 0.0043T}{1.1075} R_{25}$$

★The inductance test frequency is 1000Hz

BACK

AC motor

parameter chart of 130 series motors

Motor model	130ST-M04025				130ST-M05020				130ST-M05025				130ST-M06025				130ST-M07720			
Power(Kw)	1				1.0				1.3				1.5				1.6			
Nominal torque(Nm)	4				5				5				6				7.7			
Nominal speed(Rpm)	2500				2000				2500				2500				2000			
Nominal current(A)	4				5				5				6				6			
Rotor inertia(Kgm ²)	1.101×10 ⁻³				1.333×10 ⁻³				1.333×10 ⁻³				1.544×10 ⁻³				2.017×10 ⁻³			
MTC(Ms)	3.66				4.887				3.468				2.789				2.425			
ETC(Ms)	3.394				3.701				3.603				3.848				4.288			
Torque constant(Nm/Arms)	1				1				1				1				1.283			
EMF(V/Krpm)	37.715				46.485				38.665				37.335				47.585			
★ Resistance per phase(Ω)	1.108				1.222				0.867				0.602				0.66			
★ Inductance per phase(mH)	3.760				4.523				3.124				2.317				2.83			
Max current(A)	12				15				15				18				18			
Max torque(Nm)	12				15				15				18				23.1			
Number of pole-pairs	4																			
Connector of motor winding	terminal	U				V				W				⊕						
	number	2				3				4				1						
Connector of encoder (F)	signal	5V	0V	A+	A-	B+	B-	Z+	Z-	U+	U-	V+	V-	W+	W-	⊕				
	number	2	3	4	7	5	8	6	9	10	13	11	14	12	15	1				
Resolution (F) (C/T)	2500C/T																			
Connector of encoder (F1)	signal	5V	0V	A+		A-		B+		B-		Z+		Z-		⊕				
	number	2	3	4		7		5		8		6		9		1				
Resolution (F1) (C/T)	2500C/T																			
Connector of encoder (M)	signal	5V	0V	E+		E-		SD+		SD-		⊕								
	number	2	3	4		5		6		7		1								
Resolution (M) (C/T)	Single-turn 17bit (131072 C/T) multi-turn 16bit (65536 C/T)																			
Connector of encoder (E)	signal	5V	0V	NC		NC		SD+		SD-		⊕								
	number	2	3	4		5		6		7		1								
Resolution (E) (C/T)	Single-turn 17bit (131072 C/T)																			
Resolver (R)	signal	R1	R2		S1		S3		S2		S4		⊕							
	number	2	3		4		5		6		7		1							
mechanical brake	number	1				2				3										
	Power	24VDC (-15%~+10%)										⊕								
	parameter	current: ≤0.6A brake torque: ≥12Nm inertia: 1.67×10 ⁻⁴ Kgm ²																		
Insulation brake	B																			
Operating condition	temperature: 0~55℃ humidity: 小于 90% (no dew condensation)																			
Protection	IP65																			
weight (suttle) (Kg)	6.0	6.9			6.9			7.6			8.6			6.0						

Note :

MTC: Mechanical time constant

ETC: Electric time constant

EMF: Back electromotive force coefficient

U、V、W are motor windings

A+, B+, Z+, A-, B-, Z-, U+, U-, V+, V-, W+, W- signals are incremental encoder outputs

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$$R_t = \frac{1 + 0.0043T}{1.1075} R_{25}$$

★The inductance test frequency is 1000Hz

BACK

● parameter chart of 130 series motors

Motor model	130ST-M07725					130ST-M07730					130ST-M10015						
Power(Kw)	2.6					2.4					1.5						
Nominal torque(Nm)	7.7					7.7					10						
Nominal speed(Rpm)	2500					3000					1500						
Nominal current(A)	7.5					9					6						
Rotor inertia(Kgm ²)	2.017×10 ⁻³					2.017×10 ⁻³					2.595×10 ⁻³						
MTC(Ms)	2.206					2.331					2.26						
ETC(Ms)	4.213					4.369					4.557						
Torque constant(Nm/Arms)	1.116					0.856					1.667						
EMF(V/Krpm)	40.025					32.216					64.885						
★ Resistance per phase(Ω)	0.454					0.282					0.807						
★ Inductance per phase(mH)	1.913					1.232					3.675						
Max current(A)	20.7					27					18						
Max torque(Nm)	23.1					23.1					30						
Number of pole-pairs	4																
Connector of motor winding	terminal	U				V				W				⊕			
	number	2				3				4				1			
Connector of encoder (F)	signal	5V	0V	A+	A-	B+	B-	Z+	Z-	U+	U-	V+	V-	W+	W-	⊕	
	number	2	3	4	7	5	8	6	9	10	13	11	14	12	15	1	
Resolution (F) (C/T)	2500C/T																
Connector of encoder (F1)	signal	5V	0V		A+		A-		B+		B-		Z+		Z-		⊕
	number	2	3		4		7		5		8		6		9		1
Resolution (F1) (C/T)	2500C/T																
Connector of encoder (M)	signal	5V		0V		E+		E-		SD+		SD-		⊕			
	number	2		3		4		5		6		7		1			
Resolution (M) (C/T)	Single-turn 17bit (131072 C/T) multi-turn 16bit (65536 C/T)																
Connector of encoder (E)	signal	5V	0V		NC		NC		SD+		SD-		⊕				
	number	2	3		4		5		6		7		1				
Resolution (E) (C/T)	Single-turn 17bit (131072 C/T)																
Resolver (R)	signal	R1		R2		S1		S3		S2		S4		⊕			
	number	2		3		4		5		6		7		1			
mechanical brake	number	1				2				3							
	Power	24VDC (-15%~+10%)										⊕					
	parameter	current: ≤0.6A brake torque: ≥12Nm inertia: 1.67×10 ⁻⁴ Kgm ²															
Insulation brake	B																
Operating condition	temperature: 0~55℃ humidity: 小于 90% (no dew condensation)																
Protection	IP65																
weight (suttle) (Kg)	8.6					8.6					10.6						

Note :

MTC: Mechanical time constant

ETC: Electric time constant

EMF: Back electromotive force coefficient

U、V、W are motor windings

A+, B+, Z+, A-, B-, Z-, U+, U-, V+, V-, W+, W- signals are incremental encoder outputs

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$$R_t = \frac{1 + 0.0043T}{1.1075} R_{25}$$

★The inductance test frequency is 1000Hz

AC Motor

● parameter chart of 130 series motors

parameter chart of 130 series motors																	
Motor model	130ST-M10025						130ST-M15015						130ST-M15025				
Power(Kw)	2.6						2.3						3.9				
Nominal torque(Nm)	10						15						15				
Nominal speed(Rpm)	2500						1500						2500				
Nominal current(A)	10						9.5						17				
Rotor inertia(Kgm ²)	2.595×10 ⁻³						4.32×10 ⁻³						4.32×10 ⁻³				
MTC(Ms)	2.071						2.396						1.764				
ETC(Ms)	4.729						5.138						5.642				
Torque constant(Nm/Arms)	1						1.579						0.882				
EMF(V/Krpm)	38.76						68.13						34.073				
★ Resistance per phase(Ω)	0.266						0.461						0.106				
★ Inductance per phase(mH)	1.258						2.369						0.598				
Max current(A)	30						28.5						51				
Max torque(Nm)	30						45						45				
Number of pole-pairs	4																
Connector of motor winding	terminal	U				V				W				⊕			
	number	2				3				4				1			
Connector of encoder (F)	signal	5V	0V	A+	A-	B+	B-	Z+	Z-	U+	U-	V+	V-	W+	W-	⊕	
	number	2	3	4	7	5	8	6	9	10	13	11	14	12	15	1	
Resolution (F) (C/T)	2500C/T																
Connector of encoder (F1)	signal	5V	0V	A+		A-		B+		B-		Z+		Z-		⊕	
	number	2	3	4		7		5		8		6		9		1	
Resolution (F1) (C/T)	2500C/T																
Connector of encoder (M)	signal	5V	0V	E+		E-		SD+		SD-		⊕					
	number	2	3	4		5		6		7		1					
Resolution (M) (C/T)	Single-turn 17bit (131072 C/T) multi-turn 16bit (65536 C/T)																
Connector of encoder (E)	signal	5V	0V	NC		NC		SD+		SD-		⊕					
	number	2	3	4		5		6		7		1					
Resolution (E) (C/T)	Single-turn 17bit (131072 C/T)																
Resolver (R)	signal	R1		R2		S1		S3		S2		S4		⊕			
	number	2		3		4		5		6		7		1			
mechanical brake	number	1				2				3							
	Power	24VDC (-15%~+10%)												⊕			
	parameter	current: ≤0.6A brake torque: ≥12Nm inertia: 1.67×10 ⁻⁴ Kgm ²															
Insulation brake	B																
Operating condition	temperature: 0~55℃ humidity: 小于 90% (no dew condensation)																
Protection	IP65																
weight (suttle) (Kg)	10.6						14.6						14.6				

Note :

MTC: Mechanical time constant

ETC: Electric time constant

EMF: Back electromotive force coefficient

U、V、W are motor windings

A+, B+, Z+, A-, B-, Z-, U+, U-, V+, V-, W+, W- signals are incremental encoder outputs

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$$R_t = \frac{1 + 0.0043T}{1.1075} R_{25}$$

★The inductance test frequency is 1000Hz

BACK

AC motor

● parameter chart of 150 series motors

Motor model	150ST-M15025				150ST-M18020				150ST-M23020				150ST-M27020				
Power(Kw)	3.8				3.6				4.7				5.5				
Nominal torque(Nm)	15				18				23				27				
Nominal speed(Rpm)	2500				2000				2000				2000				
Nominal current(A)	16.5				16.5				20.5				20.5				
Rotor inertia(Kgm ²)	6.15×10 ⁻³				6.33×10 ⁻³				8.94×10 ⁻³				11.19×10 ⁻³				
MTC(Ms)	2.59				2.106				2.062				2.109				
ETC(Ms)	6.172				6.364				6.963				7.028				
Torque constant(Nm/Arms)	0.909				1.091				1.122				1.317				
EMF(V/Krpm)	35.09				41.7				43.46				50.5				
★ Resistance per phase(Ω)	0.116				0.132				0.097				0.109				
★ Inductance per phase(mH)	0.716				0.84				0.674				0.766				
Max current (A)	49.5				49.5				61.5				61.5				
Max torque(Nm)	45				54				69				81				
Number of pole-pairs	4																
Connector of motor winding	terminal	U				V				W				⊕			
	number	2				3				4				1			
Connector of encoder (F)	signal	5V	0V	A+	A-	B+	B-	Z+	Z-	U+	U-	V+	V-	W+	W-	⊕	
	number	2	3	4	7	5	8	6	9	10	13	11	14	12	15	1	
Resolution (F) (C/T)	2500C/T																
Connector of encoder (F1)	signal	5V	0V	A+	A-	B+	B-	Z+	Z-					⊕			
	number	2	3	4	7	5	8	6	9	10	13	11	14	12	15	1	
Resolution (F1) (C/T)	2500C/T																
Connector of encoder (M)	signal	5V	0V	E+		E-		SD+		SD-		⊕					
	number	2	3	4		5		6		7		1					
Resolution (M) (C/T)	Single-turn 17bit (131072 C/T) multi-turn 16bit (65536 C/T)																
Connector of encoder (E)	signal	5V	0V	NC		NC		SD+		SD-		⊕					
	number	2	3	4		5		6		7		1					
Resolution (E) (C/T)	Single-turn 17bit (131072 C/T)																
Resolver (R)	signal	R1		R2		S1		S3		S2		S4		⊕			
	number	2		3		4		5		6		7		1			
mechanical brake	number	1				2				3							
	Power	100VDC (-15%~+10%)										⊕					
	parameter	current: ≤0.4A brake torque: ≥30Nm inertia: 6×10 ⁻⁴ Kgm ²															
Insulation brake	B																
Operating condition	temperature: 0~55℃ humidity: 小于 90% (no dew condensation)																
Protection	IP65																
weight (suttle) (Kg)	15.7				17.8				21.4				23.7				

Note :

MTC: Mechanical time constant

ETC: Electric time constant

EMF: Back electromotive force coefficient

U、V、W are motor windings

A+, B+, Z+, A-, B-, Z-, U+, U-, V+, V-, W+, W- signals are incremental encoder outputs

A+, B+, Z+, A-, B-, Z- signals (compound signal) are wireless encoder signal

E+, E- are down-lead of battery SD+, SD- are date outputs

R1—R2 are primary signals S1—S3, S2—S4 are secondary signals

★The value of resistance will change with temperature , if resistance is R_{25} at a temperature of 25℃ , when the temperature change to T , the value of the resistance will change to R_t , R_t is :

$$R_t = \frac{1 + 0.0043T}{1.1075} R_{25}$$

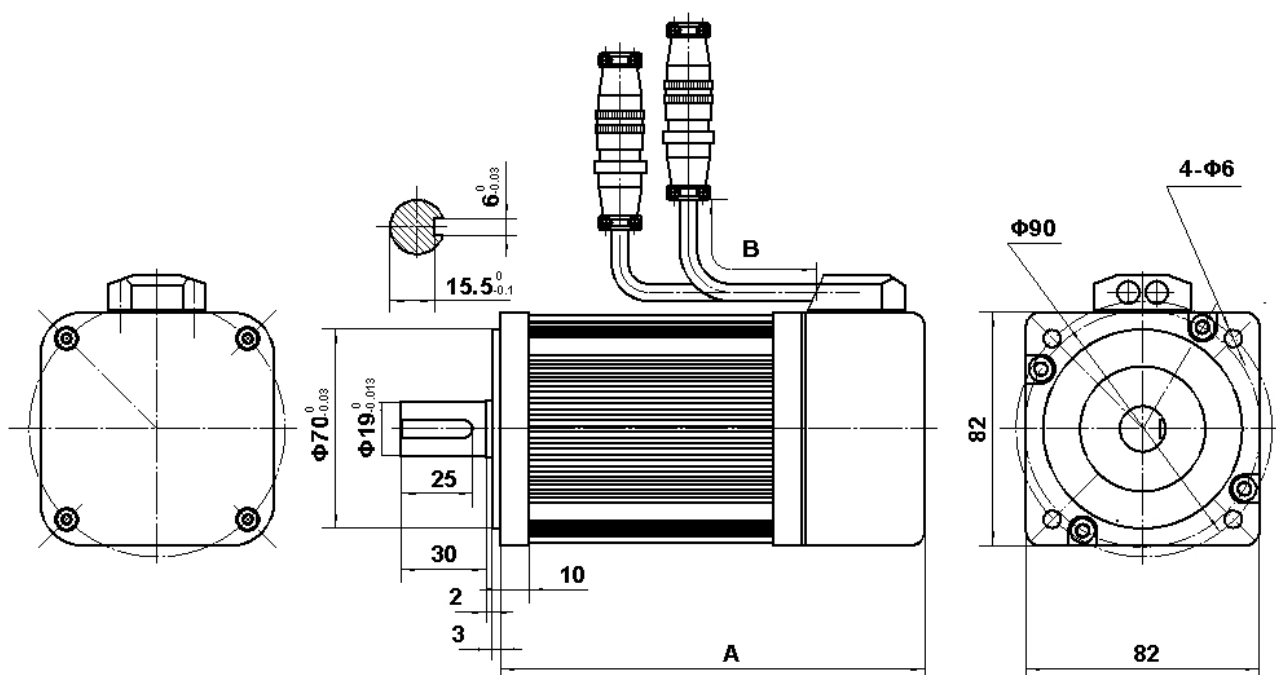
★The inductance test frequency is 1000Hz

BACK

AC motor

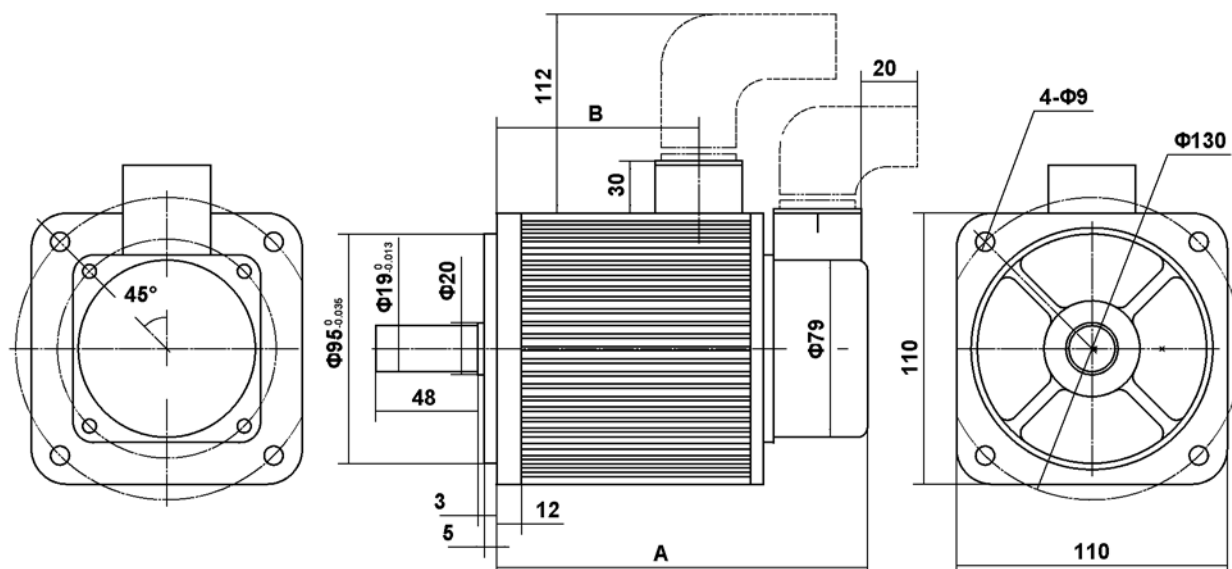
● Mounting size of AC motor

80 series motor



torque(Nm)	1.3	2.4	3.3
A(mm)	128	150	165
B(mm)	500	500	500

110series motor



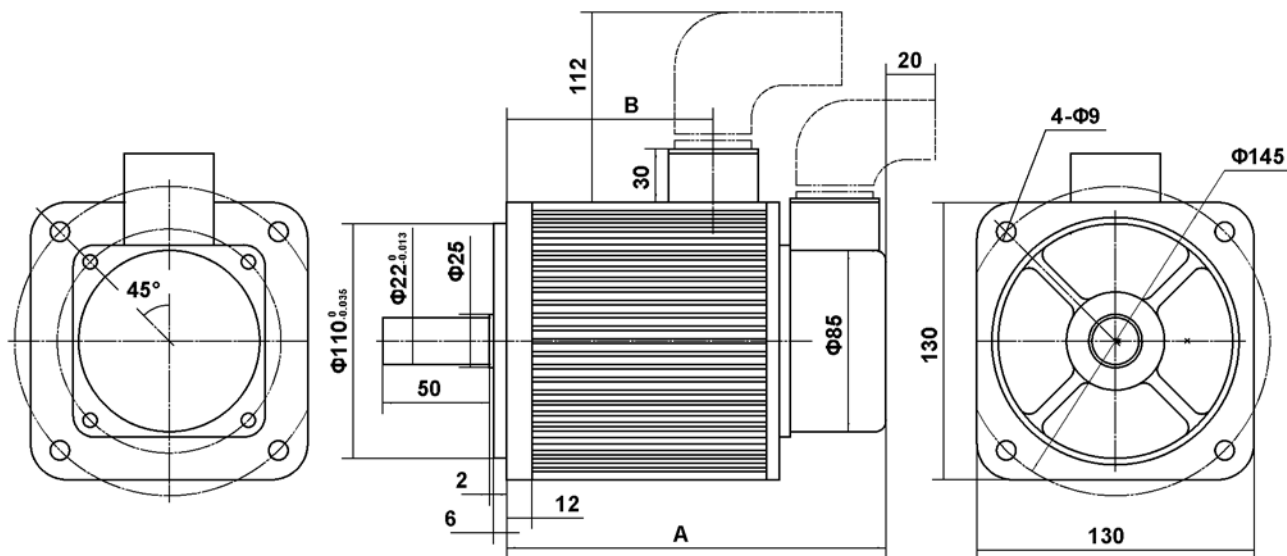
torque (Nm)	2	4	5	6
A(mm)	158 (200)	185 (227)	200 (242)	217 (259)
B(mm)	76	102	118	134

Note : the number in parenthesis is the size of motor equipped brake.

AC motor

● Mounting size of AC motor

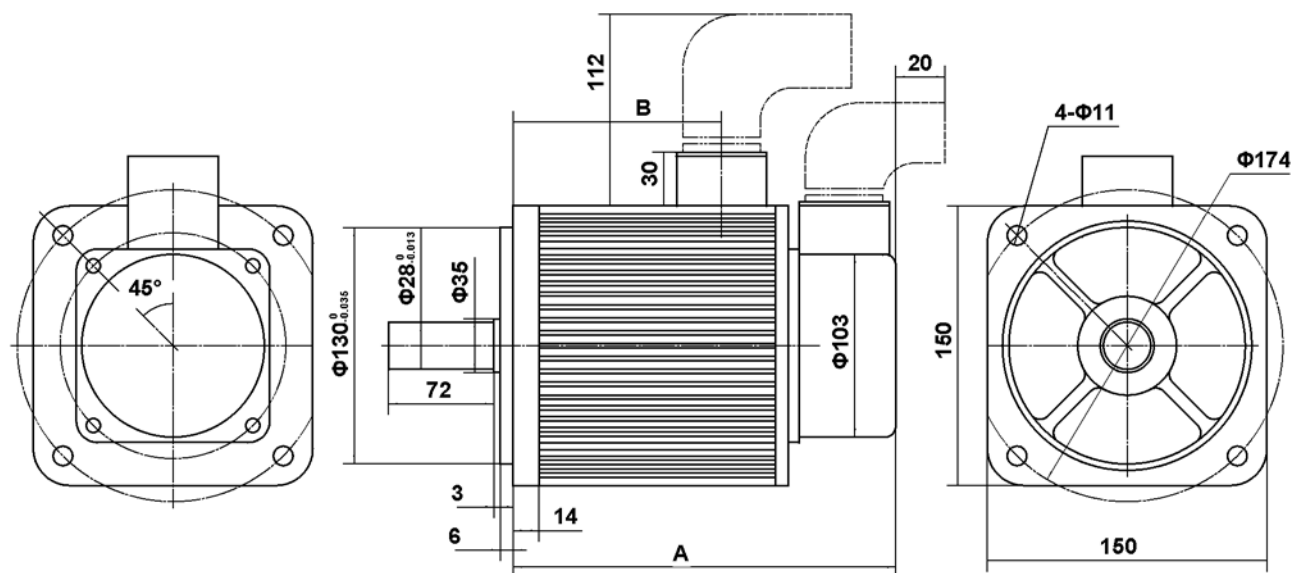
130 series motor



torque(Nm)	4	5	6	7.7	10	15
A(mm)	163 (205)	171 (213)	181 (223)	195 (237)	219 (261)	267 (309)
B(mm)	80	89	98	112	136	184

Note : the number in parenthesis is the size of motor equipped brake.

150 series motor



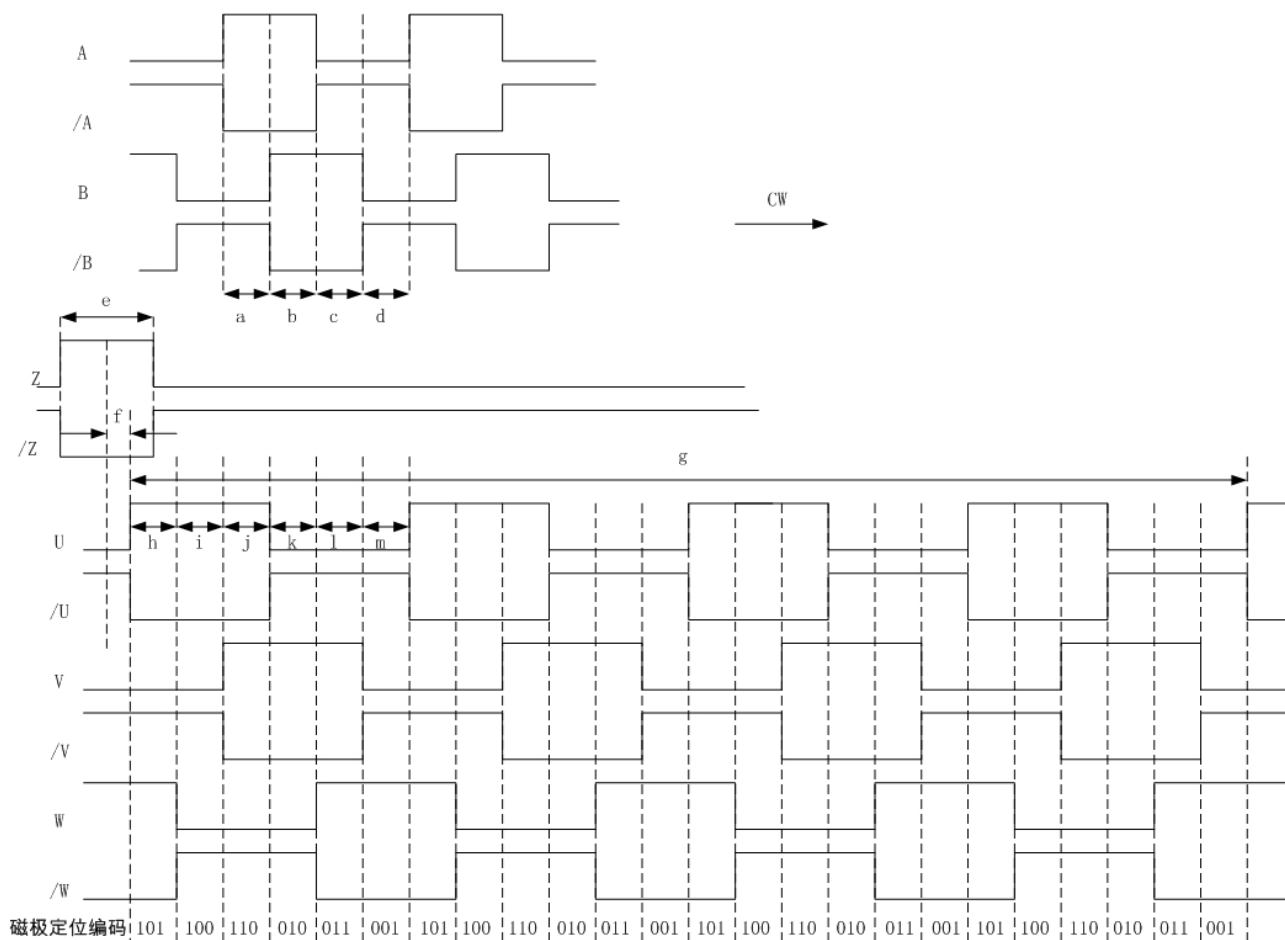
torque(Nm)	15	18	23	27
A(mm)	231 (293)	250 (312)	280 (342)	306 (368)
B(mm)	146	166	196	222

Note : the number in parenthesis is the size of motor equipped brake.

Encoder introduction

● incremental encoder (F)

Incremental encoder (F) output



Note :

CW: circumscribe clockwise (seen from flange side).

The angular offset value of ST series servo motor is 2650 unit, there are 10000 unit per circuit (a unit is 0.036° (mechanical angle)).

$$g = 360^\circ \text{ (mechanical angle)}; T = \frac{360}{2500}; a, b, c, d = \frac{T}{4} \pm \frac{T}{8}; f : \pm 1^\circ \text{ (mechanical angle)}; e = T \pm \frac{T}{2};$$

$$h + i + j + k + l + m = 90^\circ \text{ (mechanical angle)}; h, i, j, k, l, m = 15 \pm 1^\circ \text{ (mechanical angle)};$$

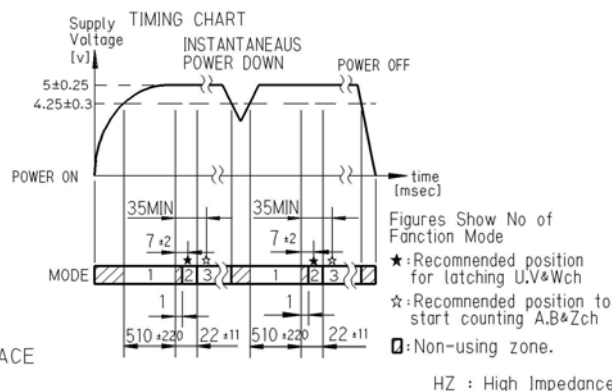
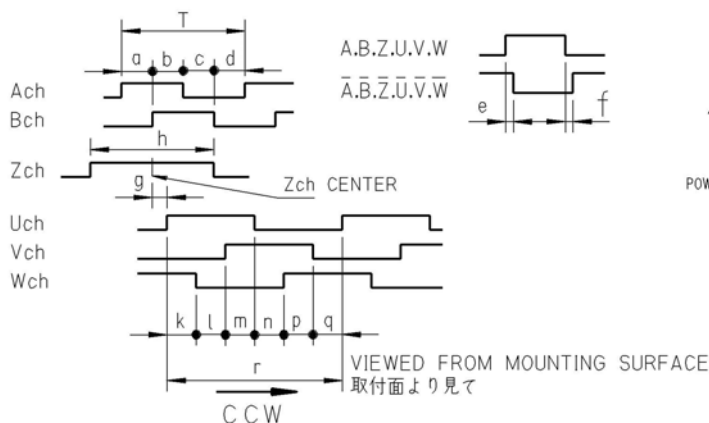
Parameter

voltage	DC5V \pm 5%
current	\leq 200mA
Max frequency	200KHz
Max speed	6000rpm
interface	26LS31 etc.

Encoder introduction

● wireless incremental encoder (F1)

Incremental wireless encoder (F1) output



$$a, b, c, d = \frac{T}{4} \pm \frac{T}{8} \quad T = \frac{360^\circ}{2500}$$

$$h = T \pm \frac{T}{2}$$

$$k, l, m, n, p, q = 15^\circ \pm 1.5^\circ \text{ (MECHANICAL)}$$

$$r = 90^\circ \pm 1.5^\circ \text{ (MECHANICAL)}$$

$$g = \pm 1^\circ \text{ (BETWEEN Zch CENTER AND Uch RISE)}$$

Note :

When a driver start operating, the U、V、W signals of encoder are used once and then not used. The data wire transfer the A、B、Z signals of encoder. So the U、V、W signals and A、B、Z signals share the data wire

The parameter of the wireless encoder signal is same as normal

The wireless encoder is the TAMAGAWA company production.

Parameter

voltage	DC5V±5%
current	≤200mA
Max frequency	200KHz
Max speed	6000rpm
interface	26LS31 etc.